A Corporate Publication of Santee Cooper

POWERsource

Winter **2012**

From the CEO

Due to three factors beyond Santee Cooper's control, power costs are rising. Knowing full well the impact rising electricity costs have on job creation and retention, our customers' wallets and economic development opportunities for South Carolina, we are continuing to think differently and creatively to temper these costs for our residential, commercial, wholesale and industrial customers. We are proud that, despite these increasing cost pressures, our rates remain among the lowest in the Southeast and well below the national average.

The three factors, which are impacting all utilities around the country, are the cost of fuel, transportation and regulations. We have and will continue to work with our customers to find innovative solutions to these increasing cost pressures.

The cost of fuel is the largest driver of the cost of electricity. It is beyond our control except to the extent we are able to negotiate favorable pricing. We continue to hammer on that and in fact have dramatically altered our structure, philosophy and policies surrounding fuel purchasing to that end.

An increasingly high percentage of the cost of electricity is driven by government regulations. Existing EPA regulations have cost our customers $1 billion in environmental equipment, with an additional $165 million in annual operating costs.

As for Santee Cooper, we are working to counter these cost increases with innovative approaches to reduce power costs, such as energy efficiency programs for residential and commercial customers that could help us delay building new generation. Looking ahead, we are considering discounted economic development rates for industrial customers who expand, bringing new jobs and investment dollars to our state.

This strategy continues what we have been doing for years. By providing the most reliable and quality products and services, we've been able to effectively serve our growing state for the past 77 years. We aim to be the most innovative and creative utility in the world, which leads to enhanced economic development and attractive power rates that effectively market South Carolina to the globe.

With the global economy dynamically changing, we accept the challenge that more than ever, we need to effectively partner with all our customers. Innovation and creative thinking have long been hallmarks of Santee Cooper's success, and by working together, we can and will successfully discover the solutions to recruiting and retaining industry and jobs for South Carolina.

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President and Chief Executive Officer

santee cooper®

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By Kevin F. Langston
Photography by Jim Huff

About the cover: An insider's view of Cross Generating Station's stack is impressive. The low-angle view reveals the scrubber outlet ducts of units 3 and 4 entering the bottom of their corresponding stacks.

From Zero to 3,600

START-ME-UP

By Kevin F. Langston

Photography by Jim Huff

In the 1960s cartoon “The Jetsons,” George Jetson has a pretty cushy job at Spacely Space Sprockets. He works a full-time schedule of nine hours a week, and his duties as “digital index operator” primarily consist of pressing the button that brings the sprocket factory to life.

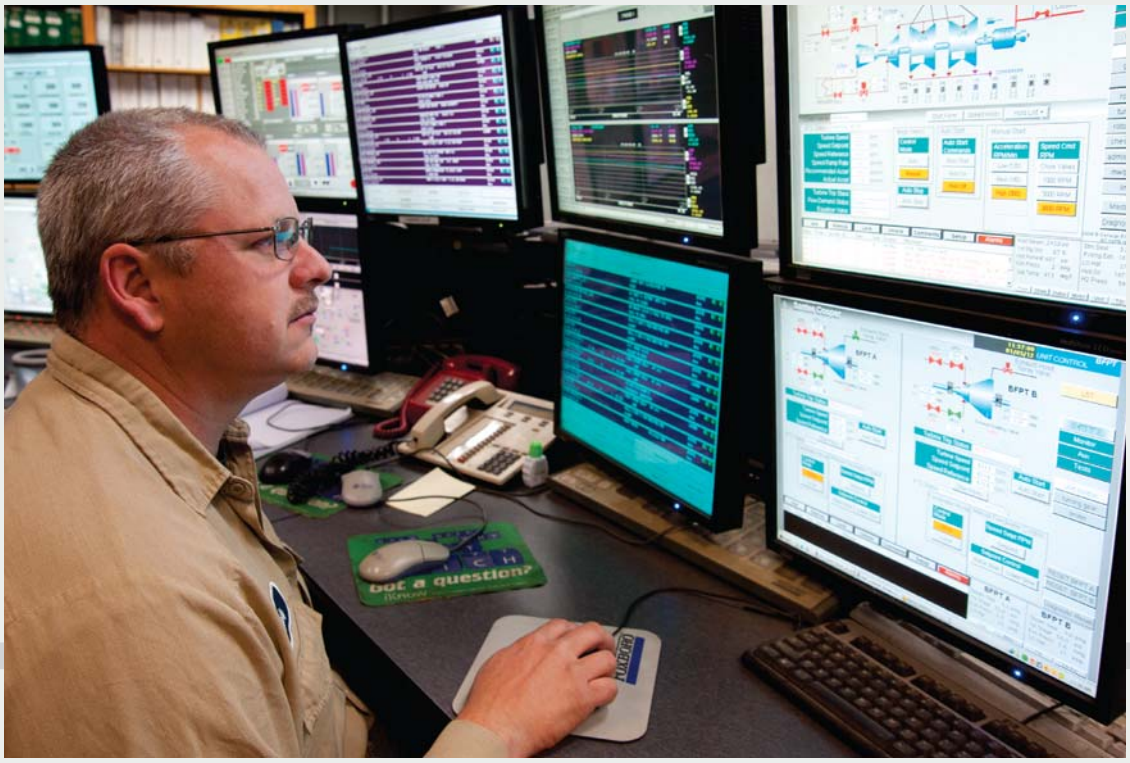
Back in the real world, people like Billy Dixon, Jeffrey Hood, Timothy Swicord and Steve Gaskins laugh at the idea of such a simple solution to a complex process. They are the superintendents at Cross Generating Station. Cross is Santee Cooper’s largest generating facility (and South Carolina’s largest fossil fuel-fired generating station), and its four base load units are capable of producing a combined 2,320 megawatts of electricity.

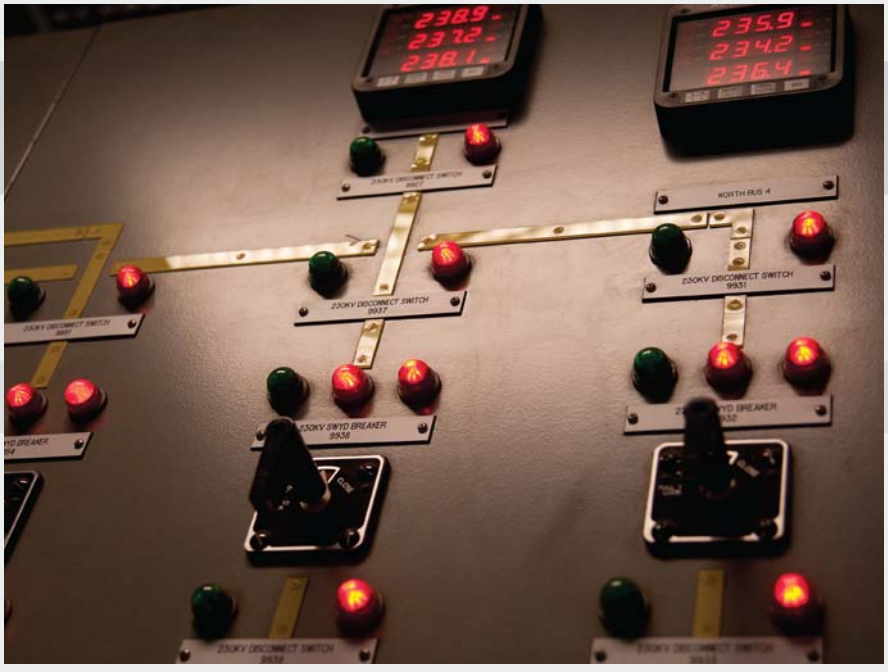
Your car engine has an imposing assortment of parts designed to work in concert with one another to keep the vehicle running properly. They spring into action with the turn of a key in the ignition.

Think of Cross’s four units as automobile engines on an exponentially larger scale. Starting up these engines takes a lot more than pressing a button or turning a key. It’s a process that takes up to 18 hours and involves a team of employees, and it’s more reminiscent of a NASA launch sequence.

Left to right: Superintendents Steve Gaskins (Maintenance), Timothy Swicord (Technical Services), Jeffrey Hood (Maintenance) and Billy Dixon (Operations) gather on the turbine floor of Cross Generating Station.

[BONUS: See how electricity is made on page 11]





Top: Unit Operator Andy Capps keeps watch over an imposing array of monitors that relay information about the unit's performance. The unit operator coodinates the entire start-up procedure.

Bottom: Unit 3 Generator Breakers

Call Me

Cross Unit 1 has been idle much of the fall, which is atypical. Cross is equipped with the newest and most efficient coal-fired units in Santee Cooper's generation fleet, meaning they're typically the first ones called into action and the last ones to be shut down.

"This is a unique circumstance for Cross, because the weather has been pretty mild," says Dixon, superintendent of operations. Besides the mild winter conditions, the price of natural gas has been so low that it's been cheaper for Santee Cooper to bump its natural gas units to the front of the base load lineup.

"Unit 1 has been in reserve standby for a few weeks," Dixon says. "The equipment is shut down, except for some cooling pumps, and the boiler is full of water."

That's how the unit will remain, until the red phone from System Control rings.

"There's actually a red phone on the desk," says Swicord, superintendent of technical services. "There's no dialing; they just pick up the phone and ring the control room. If System Control were to call us right now, we'd initiate the start-up procedure. We have a 15-page document that outlines the entire process to ensure we don't miss a step."

Before it even reaches this point, however, there will have been some discussion at a pretty high level to consider start-up costs and the need for the electricity. Once the decision is made, System

And you thought your car's dashboard was intimidating? Unit Operators Capps (left) and William Bremmer (right) keep a close eye on Cross units 3 and 4.

Control will have an idea of how long it will take for the unit to be brought online, and the process will be dictated by that timetable.

The main driver determining the startup duration is the temperature of the turbine. The longer the unit has been offline, the more pre-warming is required. If a Cross unit has been offline for only a day or two the duration of start-up is usually eight hours or less. If the unit has been down for several weeks, the startup could easily take twice as long.

Light My Fire

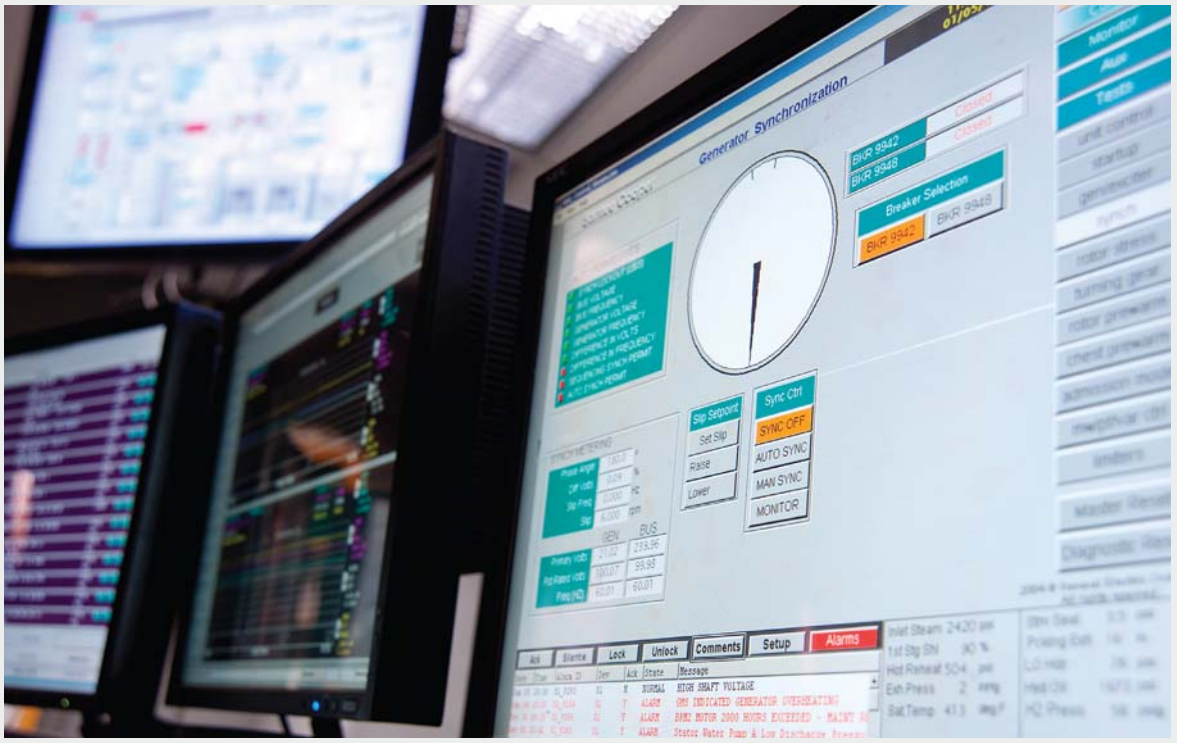
"We basically start with equipment like fans and pumps," Dixon says, "and then we put a fire in the boiler. We start building pressure, and as we are building pressure and temperature in the boiler, we start pre-warming the turbine."

At this point, the emissions control equipment goes into service, and emission instruments are calibrated.

E&I Technician Ben Gundran verifies instrument readings during start-up.

This fan is one of the many components that make up a base load unit.

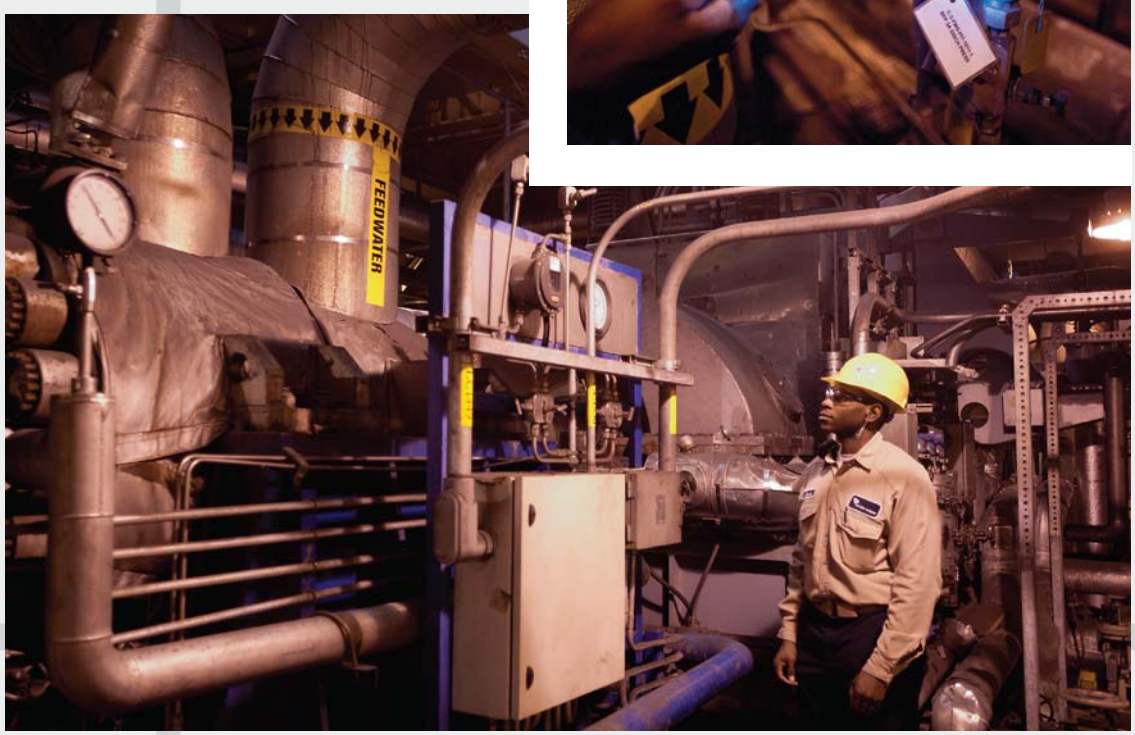
Cross Unit 4's turbine and generator



Once the pressure and temperature in the boiler reach ideal levels, steam is slowly released into the turbine. In general, turbines are rotary engines that are driven by blades (such as windmills). To generate electricity, the steam from the boiler turns the blades at incredibly high speed, which then turns the electromagnet inside the coils of the generator. But before any of this can happen, the turbine must be pre-warmed.

"Warming the turbine is really all about heat and thermal expansion — getting the temperatures to match," Dixon says. "If you put hot steam on a cool turbine, you risk major mechanical damage in the turbine. These turbine blades are built with clearances to within thousandths of an inch; the clearances in a turbine are paper-thin. So, it's critical to reach thermal saturation at a consistent and uniform rate. It's a huge piece of steel, and it's got to be done right."

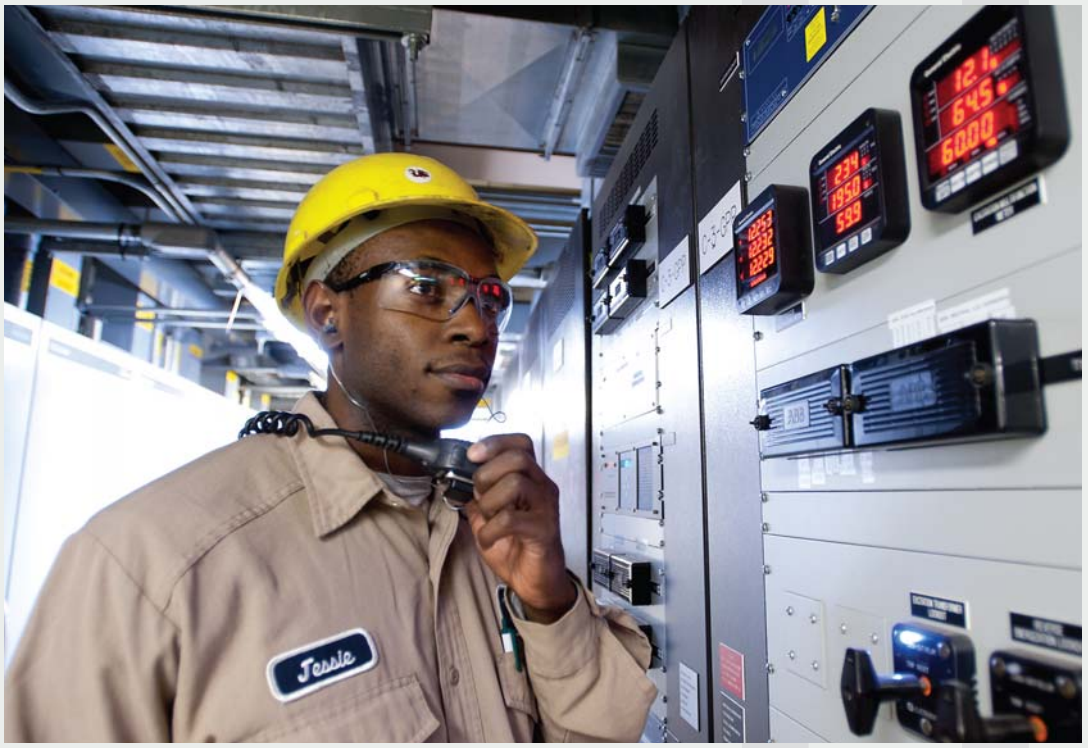
Auxiliary Operator Jesse Gillians performs a viisual inspection of the boiler feed pump during a unit start-up



When the metal temperatures in the turbine are adequate, the next step is to ramp up its speed until it reaches 3,600 revolutions per minute.

"From there, we synchronize the frequency of the generator to the system. Then we close the breakers and start increasing the load on the unit," Dixon says. "That's a quick summary, of course; the entire process, on a cold start, takes somewhere between 15 and 18 hours."

Technical Associate Brantley Ellis runs some chlorine samples in Cross Generating Station's results lab.



Gillians gives readings from the relay room to the unit operator.

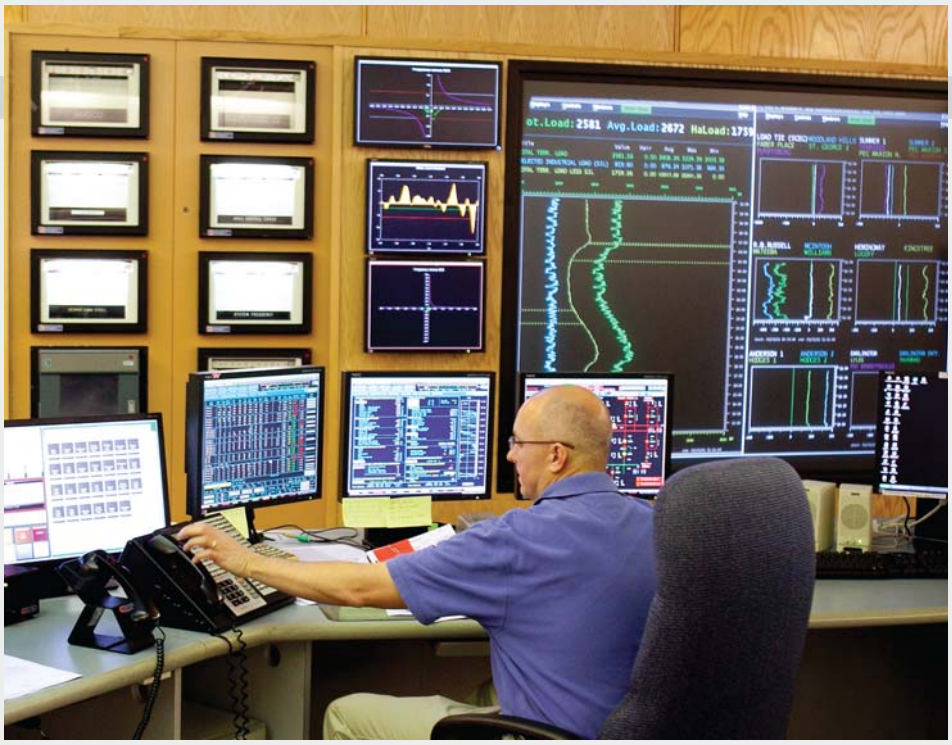
Once the unit is online, lab technicians check the chemistry of the water that becomes steam, to make sure it's set to strict specifications. "The next step is to put our environmental equipment into service, so it can properly capture and treat emissions," Swicord says. "There's a lot of synchronization involved throughout every step of the process."

Murphy's Law

Any number of problems can emerge during a unit start-up, which means employees must be prepared to respond.

Swicord says employees involved with the start-up have a pretty defined scope of what they're supposed to be doing and the sequence in which everything is supposed to happen.

"Every department knows its role," he says. "The technicians monitor the start-up through the distributed control system and respond to trouble as needed. The mechanics are in stand-by mode until they're called in to work on something; they have work they can be doing in the meantime, but start-up repairs take priority. Meanwhile, lab technicians are performing air-flow and water-chemistry testing."



Clockwise from top: System Controller Christopher Allen monitors Santee Cooper's system load and generation resources from the Energy Control Center at Santee Cooper headquarters. Allen's responsibilities include ensuring that Santee Cooper's generation resources meet the system load and are in compliance with the North American Electric Reliability Corporation's reliability standards. If a unit needed to be brought online, the call would come from this desk.

"There's a lot going on and a lot of communication that has to take place," Dixon says. "Getting from Point A, which is a cold unit, to Point B, which is being online, involves a group of about 20 employees who are working together to overcome any hurdles we may encounter. It's very impressive to listen to the radio chatter during a start-up because of all the activity involved."

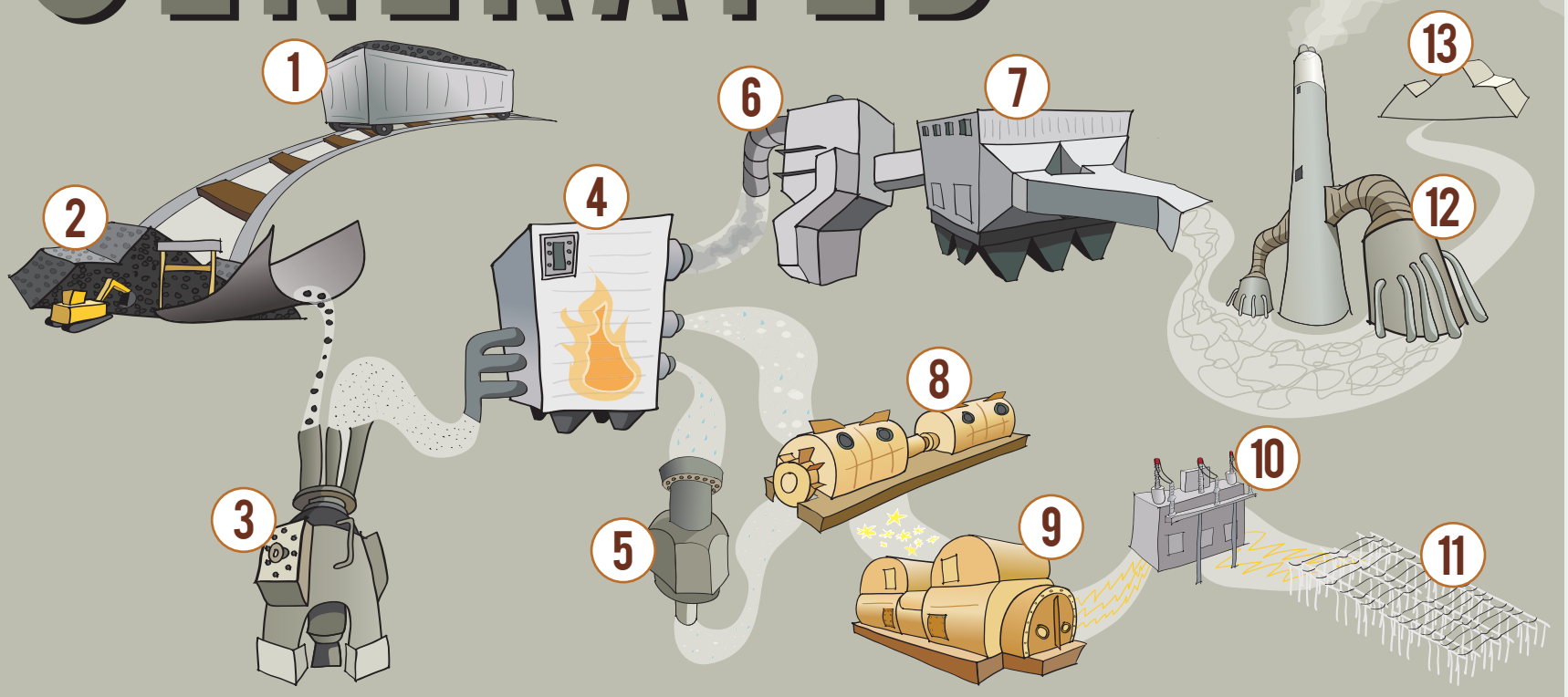
Dealing with components that have sat still for a long time always presents a challenge, Hood says. "There are thousands of control points, and if there's a malfunction on any one of those points you've got to have those people who are insightful enough to diagnose and correct it."

Bringing a base load unit online is a complex coordinated effort that relies on communication and cooperation. So, the next time you flip a light switch in your home, think of that team of real-life George Jetsons who are making sure the power is there when you need it. PS

Scrubbers (left) and precipitators (right) are part of the unit's environmental control equipment.

HOW ELECTRICITY IS GENERATED

The process of making electricity begins with fuel, and coal makes up about three quarters of Santee Cooper's total energy supply.



Coal is delivered by rail 1 to Santee Cooper's Cross, Grainger, Jefferies and Winyah generating stations where it is stockpiled 2 at their coal yards. Conveyers transport the coal to pulverizers 3, which grind it into a fine black powder. This powder is used to heat the furnace 4 to 2,500 degrees. The furnace heats purified water, which flows through a closed-pipe system known as the boiler 5, and converts it to steam. That pressurized steam travels through the pipes at 1,000 degrees and is forced through the blades of the turbine 8, which spin at 3,600 revolutions per minute. The turbine turns the electromagnet inside the coils of the generator 9, which then produces electricity. Finally, the electricity's voltage is amplified through a step-up transformer 10 and switchyard 11 before it enters Santee Cooper's transmission and distribution networks, where it is delivered to customers.

Before any exhaust air is released through the stack, it travels through a series of environmental controls. The process of selective catalytic reduction 6 uses ammonia to remove nitrous oxide. The precipitators 7 are electromechanical devices that use high voltage electricity to remove dust and ash from the stack exhaust. The "smoke" you see released by through the stacks is actually just water vapor. But before it reaches the stack, the exhaust makes a final trip through the unit scrubbers 12, which use a wet mixture of limestone to remove sulfur dioxide. Byproducts of these environmental controls are stored 13 on site, and more than 1 million tons are recycled annually as material is used in cement, wall board and other products.


MORE THAN
HEADSETS

By Nicole A. Aiello

Photography by Jim Huff

Ken Sandiford, manager of Santee Cooper's Call Center, has worked with customers and the Call Center team since 1999 and has firsthand experience with many of the Call Center's changes and challenges.

If you spent a day in Santee Cooper's Call Center, you might think the term "call center" is a bit inadequate. Through the utilization of new technology and communication tools, Santee Cooper's Call Center is much more of a customer solution center than a typical place that only answers customers' phone calls.

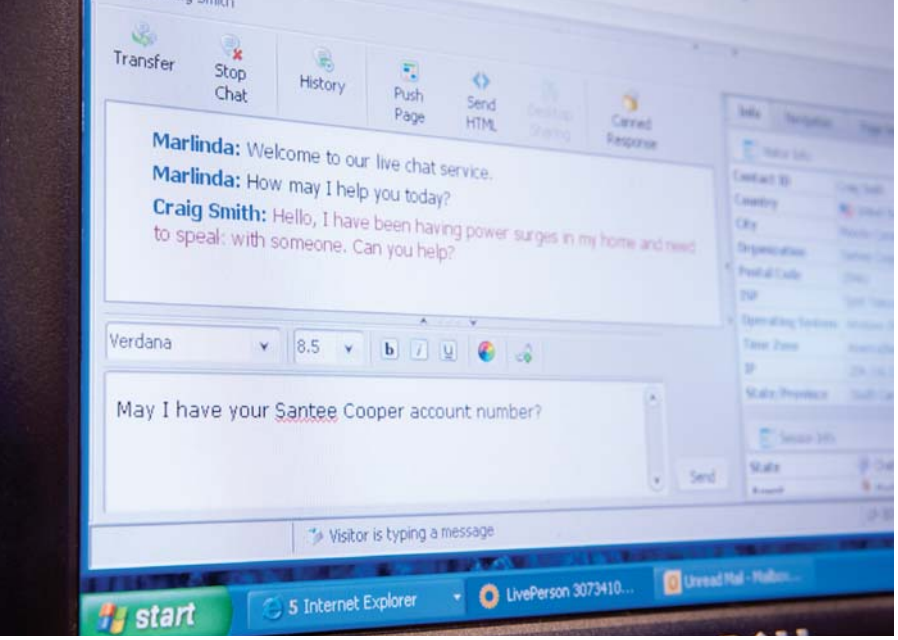
Just talk to Call Center Manager Ken Sandiford and you'll begin to understand why. Sandiford knows the Call Center's ins and outs, challenges and team members probably better than anyone else in the utility. He's worked with Santee Cooper for 21 years and has been with the Call Center since it became a permanent feature in 1999.

According to Sandiford, Call Center customer services representatives (CSRs) don't just answer phones, they also deliver answers and are expert problem solvers. And now, the ways CSRs interact with customers are evolving.

"Call Center CSRs aren't focused exclusively on calls anymore. They are taking on additional challenges and responsibilities, like email correspondence and live chat," Sandiford said. "In reality, though, the Call Center has never been only about calls. It's always been about customers and our interactions with them, no matter how that interaction takes place as technology progresses."

And there have been some significant changes in customer interaction over the years. What started as two CSRs dedicated solely to answering phones grew to five CSRs answering 60,000 calls during a six-month pilot program in 1999.

Working closely together on a daily basis and relying on each other for support has made Santee Cooper Call Center employees consider themselves not only a team, but a family.



Left: **Live chat debuted as a regular customer service feature in January.**

Right: **Marlinda Livingston is one of three Santee Cooper customer service representatives who interact online with customers through live chat.**

Over the next decade, the Call Center evolved into a permanent 27-station, open-floor work space with 15 full time CSRs, two managers and room to grow. In 2006, senior CSR DeeDee Williams picked up the responsibility of answering customer emails and, most recently, three work stations were outfitted in December for the Call Center's newest venture – live chat.

Chat, which went live at www.santeecooper.com on Jan. 1 after a seven-week trial, is a new customer service tool that allows people to have a real-time conversation with a Santee Cooper CSR using instant messaging on the website—a definite departure from the traditional phone call or email exchange.

For many people, changes can be daunting. But to CSR Marlinda Livingston, a 10-year employee of Santee Cooper, the addition of live chat has been exciting. Along with two other CSRs, Livingston is one of the faces behind the computer. When a customer logs into live chat on Santee Cooper's website, Livingston is ready to go.

"When a new conversation launches, there's a special tone I hear on my computer. When I hear that tone, I get all excited," Livingston said.

When asked how the new endeavor is going so far, Livingston smiles and says she loves it. The biggest challenge she said she's had to overcome, though, is condensing a lot of information into a small space.

"It can be nerve-wracking trying to squeeze an answer into just a couple of sentences, but I'm getting better at it every day," she said. "Live chat is still pretty new, and I'm excited to see where it goes from here."

Although customers using live chat will never hear Livingston's soft voice or see her shy smile, they will know when they're chatting with her. In Santee Cooper's live chat system, the CSR's name appears on the screen when the chat session commences.

Livingston likes the fact that customers know the name of the CSR they're chatting with. She also says she's proud that Santee Cooper's Call Center is located within the company's service territory and that many of the CSRs are Santee Cooper customers themselves.

"Many times I'll get asked if that's my real name or if I'm actually in South Carolina. I've even had people ask me if

I'm in the United States," Livingston said. "I can assure you that we are located in Horry County, we are familiar with Santee Cooper's systems and programs, and we are here and ready to help in any way we can."

Although email and live chat are the newest forms of customer communication in the Call Center, there is still a definitive emphasis on the tried and true, and talking to customers through a good old-fashioned phone call isn't going anyway anytime soon.

CSR Debbie Johnson can attest to that, answering her share of the more than 1,000 calls that come into the Call Center each day. Like Sandiford, Johnson has also been in the Call Center since the beginning. Her ability to stay calm, focused and friendly has made this the perfect job for her.

Although live chat and email have allowed customers to talk to Santee Cooper in nontraditional ways, Customer Service Representative Debbie Johnson is ready to talk directly to customers who prefer to call the Call Center.

Johnson starts her day by getting into the right mindset and leaving any of her own troubles behind. She confesses she's not a morning person, but knows the first call she answers at 8 in the morning could set the tone for the day, not so much for herself, but for her customer.

"You can make or break someone's day with just one phone call," Johnson said. "I do my best to treat each customer's call as if it's the only call I'll get all day."

Johnson's goal each day is the same goal all Call Center CSRs have—to make each customer's day a little brighter. She may do that by offering friendly greetings, calming upset callers, having compassion for customers in need or laughing when customers joke with her. Most of all, it

Customer service team members like Shelly Smalls have resources at their fingertips to help them answer customers' questions quickly and efficiently.

means she's dedicated to solving a customer's problem or question with just one phone call.

It's not always an easy job, but Johnson says it's worth it.

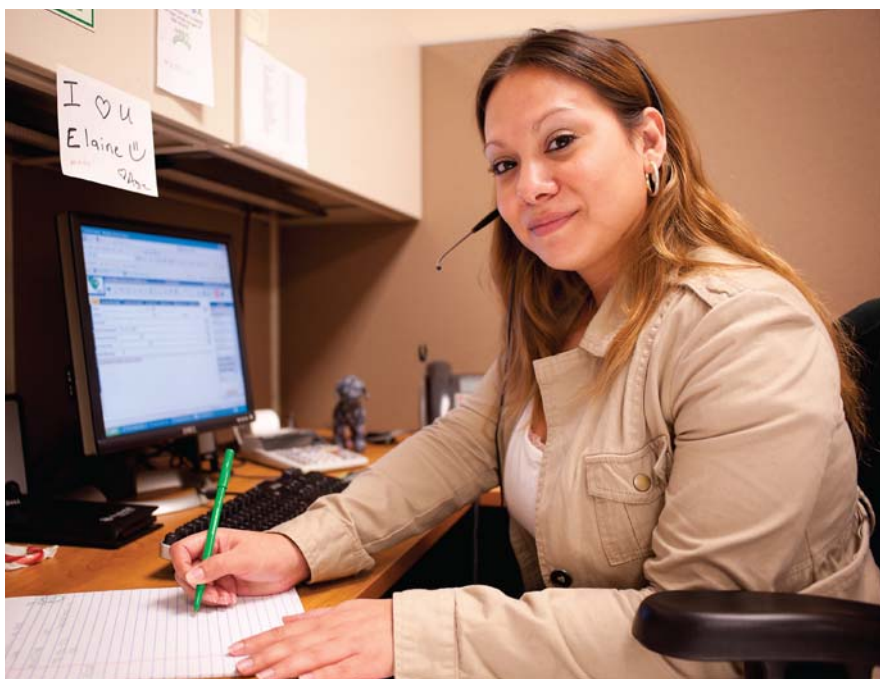
"In a typical day, we help customers with opening or closing accounts, explaining how to read their meters, answering questions on rebate or energy efficiency programs and signing up for Green Power. We have to know about each department, know the intricacies and changes in programs, understand changes in technologies we use and know how our customers are billed," Johnson said.

"It can be a daunting job, but it's also rewarding knowing I helped someone and that they had a good experience because of me."

And customer experience is what it's all about at Santee Cooper and the Call Center, regardless of whether that interaction takes place by phone, email, live chat or some other new correspondence system developed in the future.

Sandiford easily summed up this sentiment and the Call Center's outlook on customer communications in just one sentence.

"We'll do whatever we can, to meet our customers wherever they want to do business with us," he said. PS



Top: Customer Service Representatives Jessica Richardson and Catherine Floyd catch up on the day's events. Teamwork and interaction between the Call Center team members are integral in making the Call Center successful.

Bottom: Elaine Zavala is one of 15 Call Center team members who answer more than 300,000 calls each year.

WHERE FUTURES ARE BUILT

By Willard Strong Photography by Jim Huff

> "People say there are no choices in public education. I say the Academy for Technology and Academics proves otherwise."

David Stoudenmire, principal
Academy for Technology and Academics

On U.S. Highway 701 north of Conway, there sits an impressive building one might easily think is part of a college campus, not where 11th- and 12th-graders attend classes.

For the last six years, it's been home to what is essentially the reinvention of vocational education for the 21st century, an example of vision and forward thinking by the Horry County School District.

It's where highly motivated and focused students have chosen to forego their traditional junior and senior years, to embark on an educational path that may or may not include a traditional four-year college.

The Academy for Technology and Academics, north of Conway, S.C., looks like any other high school in South Carolina, but beyond the hallways one enters a world of specialized education that can form the bedrock for a career.

This is the Academy for Technology and Academics, also known as ATA. It's definitely not your father's vocational school, zeroed in on the building trades or other "blue collar" trade skills. It is high tech, a response to the current job market and the expectations employers have for the employee of today.

There are 12 career-specific majors. And while traditional vocational curricula such as automotive technology, building construction and cosmetology still thrive, they are offered alongside pre-med, business pre-law, culinary arts, nursing, engineering, and digital arts and design.

ATA is proof positive that public education, at least in Horry County, does indeed have its finger on the pulse of what many employers need. ATA offers students significant options in their last two years of high school.

Offering College Credits, Workforce

"Our mission is to provide an integrated, rigorous academic and career-major instructional focus," says David Stoudenmire, principal since the 144,000-square foot facility opened. "This will enable students to be self-directed learners. They will gain and refine employability skills. They will be able to enter educational and career pathways that will allow them to participate as successful and contributing members of a global society."

"I like science and inventing new things," says 16-year-old Taylor Littlejohn, an engineering student at ATA. "I want to help people and I think I can do that by going into biomedical engineering. In regular high school, you're getting your basic courses. Here, they take it a step further."

The Loris High School junior is a shooting guard on the school's basketball team. She's still considered to be a student at Loris, her base high school, even though she comes to ATA for a full day. Littlejohn echoes a common theme among the 522 students who walk the school's 1.4 miles of hallways.

"It's more of a business setting," she says. "They definitely challenge you."

Taylor plans on attending a four-year college after her tenure at ATA. She feels the strong background will better prepare her for the first semester "winnowing out" of freshman would-be engineers, a tradition of sorts at any undergraduate school that offers the major. And that's

Principal David Stoudenmire has been principal since ATA opened in 2006 and has devoted his life to public education and public service in Horry County. He also serves as the mayor of Loris.

Senior health science nursing students (from left) Chandler Hardee (Conway High), Brenicke Johnson (Loris High), Lamekqua Hemingway (Loris High) and Zhane Jenerette (Green Sea Floyds High) prepare for the certified nursing assistant certification test by performing bed baths.

one of the attractions of ATA. Students can earn college credits to better prepare them for college.

"We currently offer college credits for English 101, 102, Math 120 and Psychology 201," Stoudenmire says. "Next semester, we'll be offering Art 101 and CPT 170."

In many ways it is similar to a traditional high school. The school day is from 8 a.m. to 2:45 p.m., and students attend 90-minute classes.

"We have student-activity organizations that are specific to a student's major and we have academic honors organizations," says Stoudenmire, "but we don't offer sports or fine arts."

Sallie Loveland teaches 28 students in ATA's culinary arts major. Says Loveland, "The ideal culinary student is passionate about what they're doing. They're willing to try new things and want to learn new things. They learn to follow directions and learn to manage time. They learn how to handle food safely, how to prepare it properly and how to put together flavors, textures, colors and tastes. It really is a science."

Robotics co-advisor Flint Mincey and senior engineering student and robotics team member Jonathan Fox (Loris High) operate Robot #2187 of ATA's Team Volt.

Loveland says The Food Network has marketed the food industry to the public by raising its profile as a vocation that is creative and rewarding. Being close to a vacation destination such as the Grand Strand lends itself to advancing culinary studies, and nearby Charleston is becoming a destination town for "foodies" as well.

The culinary track is affiliated with the American Culinary Federation, and Loveland's students finished first, second and third in a recent culinary competition. They are able to gain significant hands-on knowledge of the industry by working with master chefs in the Myrtle Beach area. And their schooling does not necessarily end when they leave the school. For many, it's just beginning.

"My overall goal is to become a U.S. marshal, sir."

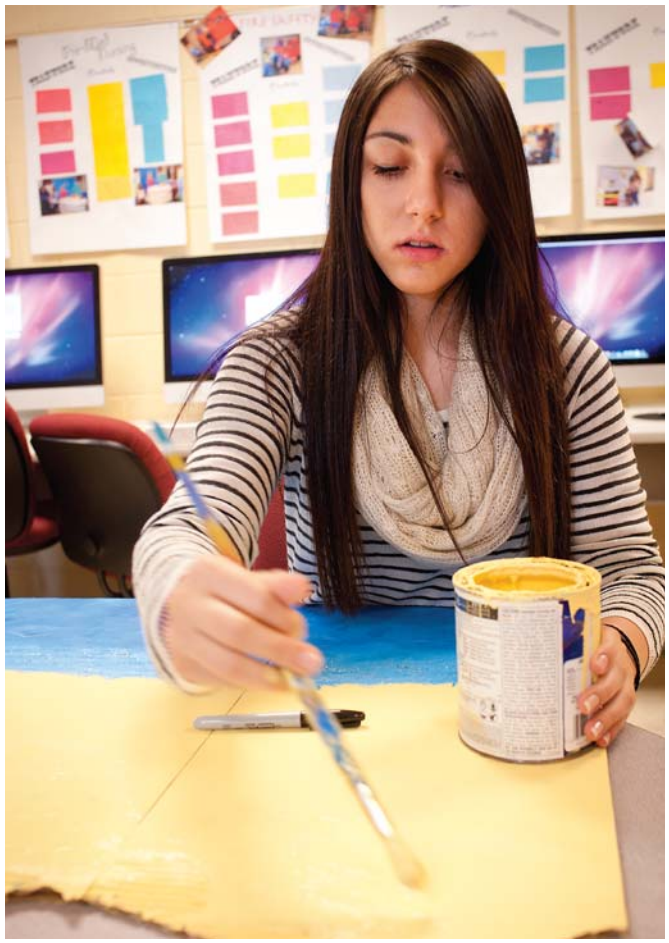
– Caleb Tja-A-Lien

"I want to help people and I think I can do that by going into biomedical engineering."

– Taylor Littlejohn

"I want to be a veterinarian and I believe I can do it."

– Ryan Messenger



Faith Williams (Carolina Forest High), a junior majoring in digital arts and design, paints a portion of a team project using traditional art tools.

"I encourage students to look toward the four-year degree," says Loveland. "On the job, I tell them to pay attention to details, make yourself indispensible and you will be the one who moves up the ladder. My students have a lot to learn and learn something new every day. I also tell them that service is the most important thing in culinary. The food is actually second. Even if the food is great, if the service is bad, most folks won't go back to that restaurant."

Future Law Enforcement Professionals, EMTs, Firefighters, Vets

"My overall goal is to become a U.S. marshal, sir."

Sixteen-year-old Caleb Tja-A-Lien does not hesitate when he responds to the question of his career intentions. He's well on the way to attaining that lofty goal by laying a solid foundation as business major in ATA's pre-law track.

A junior at North Myrtle Beach High School, Tja-A-Lien attends a full day at ATA and is planning on getting a four-year degree in political science, then becoming a police officer before moving up to the federal level. It's what he's doing outside the classroom, augmented with his ATA schedule, that's preparing him for his dream job. He's a first sergeant in a junior police program sponsored by the North Myrtle Beach Police Department.

"I do ride-alongs and get to go to courthouses, talk to lawyers and help out in other ways," Tja-A-Lien says enthusiastically. "I'm so glad to be here. I'm thankful for the teachers and my peers. They encouraged me to come here. I'm thankful for the pre-law program."

Travis Paul (Conway High), a senior building construction student, observes as the CNC router cuts out his design for a plaque.

The admissions process often begins for high school sophomores at ATA's open house, held two evenings in January. It's a good place for 10th-graders and their parents to tour the campus, meet teachers, view the work of students already enrolled and submit applications.

"It's also an opportunity for the public to come and see what we do here," Stoudenmire says. "We have volunteer opportunities for mentors in robotics, senior projects and opportunities to expand our internship sites."

You can find ATA students interning at Horry Telephone Cooperative, the city of Conway, The Horry Independent newspaper, the Horry County Department of Social Services, the Horry County Planning and Zoning Commission, and Santee Cooper. For example, business majors have interned in Santee Cooper's customer service area.

"What I've seen at this school, from the beginning, was the foresight of what was needed for students down the road," says Barbara Allen, Santee Cooper's director of educational programs. "It wasn't about passing tests. It was about mastering tasks, to help students understand knowledge and apply it."

Says Allen, "Here, they talk a lot about the 'soft skills' needed in a job, such as getting along with others. The culture here is more realistic about these things. They're really helping students find their potential."

Stoudenmire sums up his role and the culture ATA creates for students this way: "My job here is not to make life easy for you. My job is to make you succeed."

When students complete their time at ATA, they attend a senior awards program, held before their traditional high school graduations. And

Top: Michael Atwater (Conway High), a senior Project Lead the Way Engineering student, builds a robot using a VEX kit. Left: Junior pre-med students analyze the muscular structure on the anatomy found in clay mannequins. They are (from left) Kristen Mottey (Conway High), Nicole Benson (Conway High) and Katelyn Lee (Loris High),

about three-fourths of the students will leave ATA headed for college, technical college or a trade school.

"I want to be a veterinarian and I believe I can do it," says Ryan Messenger, a junior at Loris High School majoring in pre-med. "I want to have my own practice and a mobile unit to treat animals. The animal reacts so much better out of an office setting."

Messenger says ATA has anchored his life and set him on a course to veterinarian school at N.C. State University or the University of Georgia. In the absence of a vet school in South Carolina, those universities annually reserve slots for Palmetto State students.

"This is a phenomenal place," Messenger says. "It helps you get on track and get a head start. The teachers here are awesome. If you come here and are lazy, you're not going to make it."

Santee Cooper, through internship opportunities, sitting on advisory boards and assisting financially, supports the ATA mission. It's something that has not gone unnoticed by students.

"I appreciate the funds Santee Cooper provides," says Littlejohn, "because it enables students to explore options and pursue their chosen career."

Automotive Technology Instructor Randy Elliott explains to Jacob Richardson (Conway High School) and Daniel Edwards (Loris High School), automotive seniors, the inspection process of rear brakes.

Carlene Graham (Carolina Forest High), a junior cosmetology student, practices permanent-wave rolling in preparation for State Boards.

Pig Power...

A tire swing speaks to Connolly's efforts to preserve Burrows Hall as a rural retreat.

Burrows Hall, a sprawling 450-acre farm in rural Williamsburg County, has a pedigreed past as a winter playground for the storied Pulitzer family. The home burned decades ago, leaving an icehouse and ruins of the family swimming pool as reminders of glory days gone by.

Today, the property thrives as a well-run hog farm with an owner more interested in making history than reliving it.

In addition to raising hogs, farmer Duffy Connolly is also raising electricity. Specifically, and in a first for South Carolina, he is contracting with Environmental Fabrics Inc. (EFI) of Columbia to capture the methane gas associated with hog waste and use it as a fuel source for 180 kilowatts of power, power that Santee Cooper is buying as part of its renewable energy portfolio.

It's a fairly simple concept, amped up by modern technology. The waste is stored in a covered lagoon, where its heat speeds up the bacterial decomposition of the waste that in turn gives off the methane gas. The gas is piped into an engine and snap, crackle, pop, out comes electricity.

Called anaerobic digestion, the decomposition process is faster and more complete than non-heated lagoons, and—the developers hope—more profitable.

Connolly has always looked to operate his farm as a sustainable venture. When he first read about Santee Cooper building a Green Power generating station using methane gas at landfills, the proverbial light bulb (energy efficient of course) went off in his head. Hog farms yield methane gas too, as a byproduct of waste treatment. Why not turn a corner of his farm into a renewable power producer too?

In short, the answer was: because we'd never done it before. But Connolly found a receptive audience with Santee Cooper, which was busy building additional landfill generating stations and solar arrays, and researching offshore wind energy.

"Santee Cooper has been generating renewable power for a decade, using sustainable South Carolina resources," says Steve Spivey, renewable energy director for the utility. "We are eager to explore any project that is good for our environment and cost-effective for our customers."

Duffy Connolly, owner of Burrows Hall farm.

And Santee Cooper had a willing group of organizations interested in lending brain power.

While Santee Cooper has successfully generated competitively priced electricity from landfill gas, the utility had never tackled turning animal waste into power. The model for landfill generation is economically sustainable: large, mature landfills give off enough methane gas to make generation a viable enterprise. The model for animal waste also looked to large operations, but South Carolina's livestock farms weren't large enough to use that business model.

Top: The covered lagoon captures waste from the hog houses beyond and serves as a mixing ground for the methane gas that then becomes electricity. Bottom: An access door to the lagoon, which can hold about 1 million gallons.

Top: Connolly and Ricardo Hamdan of EFI, which is building the digester, in the engine room.

Bottom: Thermometers measure the temperature of water as it circulates out and back into the lagoon.

Santee Cooper turned to Clemson University's Institute for Energy Studies (SCIES) to help craft a plan that would work in South Carolina. Using a grant administered by the South Carolina Energy Office and funded by the South Carolina Department of Agriculture, SCIES helped define the project and then evaluated more than 20 different companies and approaches to completing it.

Enter EFI, which had been building digesters for years and has more than 600 digester installations operating all over the world—everywhere except South Carolina (and the Southeastern United States). EFI certainly had the track record to build successful digesters. The challenge now was to scale down and engineer a setup that would work on a smaller footprint. The opportunity was bigger: If successful, the digester built at Burrows Hall could potentially be replicated at farms across South Carolina, creating another revenue

stream for the state agriculture industry.

EFI proposed an insulated, covered lagoon system that produces methane-rich biogas as bacteria break down the organic matter. Construction began early last year and the digester was in test mode by late fall, with conditions being optimized so the bacteria in the lagoon could multiply. The engine's waste heat is used to warm up the lagoon by a heat exchange, which accelerates bacterial growth. The warmer the temperature, the quicker the digestion and the more electricity that's produced.

"You're dealing with Mother Nature," says Dennis Shanklin, CEO of EFI. "It's a biological system. It takes time."

And it shares a certain synergy with the agricultural industry. "Instead of feeding pigs, we're feeding bacteria," Shanklin says.

The covered lagoon that serves as the big methane gas laboratory takes up about a quarter-acre on a back corner of Connolly's farm. It holds about 1 million gallons, and is covered by an impermeable floating membrane that several

EFI's lagoon cover is durable. Here, it serves as a meeting ground for Connolly, Hamdan and, in the center, Santee Cooper Principal Engineer Liz Kress.

grown men can walk across at one time. Metal plates located at various points offer access to mixers that keep the process moving.

A pitched-roof scrubber, about the size of a doghouse, stands beside one edge of the lagoon. Pipes carry the gas into the scrubber and then into the engine house beyond, where it feeds an engine with a capacity of 180 kilowatts.

That engine feeds electricity to a power line that Connolly already had on his farm—and that's another reason this project seemed viable. In terms of power generation, 180 kilowatts is small potatoes, and so the cost to connect that engine to an electrical distribution system

This small building houses a scrubber that helps process the methane gas that is then piped into the engine as a fuel source to generate electricity.

would be prohibitive. (EFI builds projects that are 10 to 15 times larger.) Because Connolly's line already existed, the connection here could be upgraded instead of built from scratch.

Methane gas is a greenhouse gas 21 times more harmful than carbon dioxide, and Connolly and Shanklin both note the environmental benefits to the Burrows Hall Renewable Energy Facility.

"It's not all about making a profit," Connolly says of his decision to push this project through. "If it will clean the air, and you can afford it, you do it."

Another cost benefit lies in the technology Shanklin and EFI incorporated into the design. Much of the work is controlled remotely. "We can go weeks without actually visiting this plant," Shanklin says. He says the plant is on track to become commercially operational later this year.

EFI will continue to own and operate the generating station, and Connolly will supply the fuel. Santee Cooper is purchasing the electricity that the digester produces, and Santee Electric Cooperative, which is the source of the power for the farm, is distributing the power via its distribution system. With the involvement of Clemson and the state energy and agriculture departments, the Burrows Hall Renewable Energy Facility truly represents a model public-private partnership where we all win.

Shanklin takes special pride in his involvement. "I've built these all over the world, and learned a lot about how to make them more viable in my 25 years in the business," he says. "But this is a homegrown project. This is my first in South Carolina." PS

Celebrate The Season

The Old Santee Canal Park launched a new, month-long Celebrate The Season festival Nov. 25 featuring a mile-plus driving tour of giant holiday light displays and weekend festivals with crafts, entertainment, food and more.

In keeping with the holiday spirit, all gate admissions from the festival were donated to charities serving Berkeley County, and many of the vendors were also charitable organizations. Admission was $5 per vehicle. Celebrate The Season was powered by Santee Cooper Green Power, and the light displays all used energy efficient LED lights throughout. The event attracted 8,000 cars and provided more than $36,000 for charity.

"Celebrate The Season is a gift to Berkeley County residents and to those who live in nearby communities and want another opportunity for convenient, wholesome holiday fun," said Troy Diel, Old Santee Canal Park director. "It really represents the community coming together in the spirit of the season. It's a new community tradition that we hope will bring people back throughout this season and in years to come."

More than 35 Berkeley County businesses, including Santee Cooper, sponsored the event. Santee Cooper owns the Old Santee Canal Park.

2012 budget approved

The Santee Cooper Board of Directors approved a $2.9 billion budget for 2012 in December, along with the 2013 and 2014 budgets for planning purposes.

The 2012 budget includes $2 billion for the electric system, $6.7 million for the water systems and $932.5 million for capital expenditures. It also anticipates a rate increase of 3 to 4 percent, contingent upon completion of Santee Cooper's ongoing rate study and approval by the board later in 2012.

"Through careful planning and lean budgeting, Santee Cooper continues to do all we can to reduce or hold steady those costs that we can control," said Lonnie Carter, Santee Cooper president and CEO. "We are seeing cost increases in fuel, transportation and regulatory requirements that are outside our control, and those costs are reflected in this budget. We are also including money to begin construction of new nuclear power units that will be key to our long-term ability to continue providing reliable, affordable and environmentally responsible power."

More than half of the $2 billion electric system budget is allocated for fuel and purchased power. The fuel necessary to generate electricity and supplemental purchased power totals $1 billion, with the remaining dollars allocated to all other costs necessary to operate the utility.

Outage information online

Santee Cooper has launched its online Storm Center, a near-real-time resource that provides information to customers and other audiences about ongoing power outages. The interactive feature updates every 15 minutes and is available on Santee Cooper's Web and mobile websites.

Using Storm Center, customers can now also report outages via the Web or their smart phones at www.santeecooper.com/stormcenter.

"During storms and other outage times, we understand customers want to know Santee Cooper is not only aware of the outage, but also that we are actively working to safely restore power," said Mike Poston, vice president of retail operations.

Organizational changes announced

Santee Cooper announced a number of organizational changes in late 2011 that will facilitate preparations for upcoming nuclear construction and increased strategic planning surrounding fuel acquisition, the utility's largest expense.

On the operations side, Michael Crosby has been promoted to vice president of nuclear operations and construction. This new officer level position will lead Santee Cooper's efforts on the construction of units 2 and 3 at the V.C. Summer Nuclear Station.

On the finance side, Jeff Armfield became vice president of fuels strategy and supply. This new position will lead the strategy, procurement and management efforts of all of Santee Cooper's fuel sources. Armfield previously served as treasurer.

Suzanne Ritter has been named treasurer, in addition to her current role as vice president of corporate planning.

Dickie Thorndyke has been named manager of Cross Generating Station, Santee Cooper's largest generating facility. Thorndyke, who was manager of Rainey Generating Station in Anderson County, replaced Levon Strickland, who retired in December. Keith Smith was promoted from superintendent of maintenance to plant manager at Rainey. PS

Energy Matters

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